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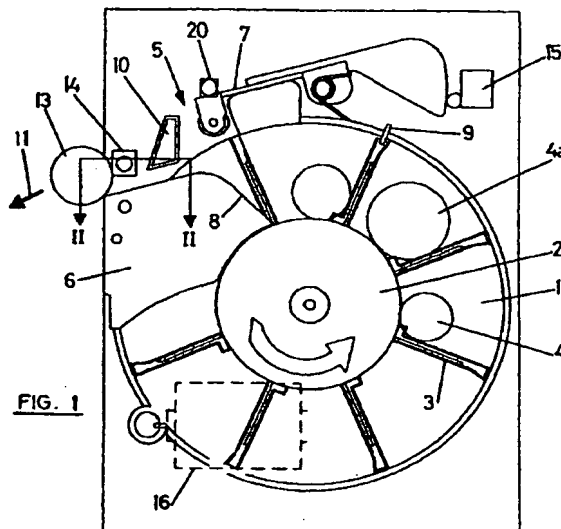
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**(54) COIN RETURNING DEVICE FOR COIN ACTUATED MACHINES**

(57) Coin dispenser for coin-operated machines, comprising a coin collecting hopper provided with a rotary extraction disc (1) which includes means (3) for carrying coins individually, and an arm (6) which deflects coins (13) towards an outlet, where an extraction trip (7) is placed. In addition, the dispenser includes means for detecting the denomination or value of coins (4, 4a) carried by the extraction disc (2) before they leave the hopper, as well as a deflection mechanism which determines if each coin exits or not depending on whether its value agrees with that of the coin to be returned in each case.



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## Description

[0001] The present invention relates to a coin dispenser for coin-operated machines, such as game machines and/or vending machines.

[0002] More specifically, the dispenser of the invention is of the type including a coin receiving hopper provided with a rotary extractor disc, provided on the surface facing the coins with means for individually carrying the coins along the rotation of the disc, with an arm intercepting this path at a certain point which deflects the coins towards an outlet opening where an extraction trip is placed, as well as means for counting and detecting the coins as they pass.

[0003] Dispensers of the above type are described for example in Spanish Utility Model no. 258.464 and in Patents EP 0266021, EP 0345868, US 5295900 and UK 2227868. In all of these the dispenser is designed for coins of a single value so that the machine will need as many dispensers as different coins it can admit, with different dispensers activated depending on the amount to be returned.

[0004] The object of the present invention is to eliminate the above mentioned problems by a dispenser which can admit two or more coins of different values and which is provided with means of discriminating the coins which must be supplied in each payment operation in order to complete the exact amount to be returned.

[0005] With this construction the number of dispensers which must be installed inside a game or vending machine is reduced, with the resulting saving in cost as well as in space and weight.

[0006] With this object, according to the invention the dispenser includes means of detecting the denomination or exact value of the coins carried by the extractor disc before these coins reach the outlet opening. The dispenser also includes a deflection mechanism which will allow or prevent exit for each coin depending on whether it agrees with the amount to be returned in each event or not.

[0007] Preferably the means of detecting the denomination or value of the coins carried by the disc will be located near the dispenser outlet opening so that the value of the coin immediately next to the outlet mouth is identified.

[0008] In this way the different coins carried by the disc will be identified consecutively as they reach the location of the detection means.

[0009] These means can rely on the size of the coins, by measuring the angle crossed by the extractor disc between two positions, an initial fixed one which detects passing of pre-established points or positions of the extractor disc and another final position which corresponds to one next to the outlet position, the latter being detected by a trip which controls coin outlet.

[0010] The dispenser of the invention can work with n different coins, which must have been previously vali-

dated upon passing a coin selector, so that the dispenser can discriminate the coins carried by the extractor disc to decide whether or not to activate a deflection mechanism which controls the outlet, allowing the coin to exit if its value agrees with the amount to return at that time, or otherwise deflecting the coin towards the hopper of the dispenser.

[0011] The different coins contained in the dispenser hopper will reach the measurement or discrimination area randomly.

[0012] The size or diameter of the coins can also be found using other systems, such as by measuring the maximum angular displacement of the coin extraction trip.

[0013] Identification of the coins can also be achieved based on their alloy, such as by an electromagnetic sensor placed near the outlet opening between a reference position and the extraction trip.

[0014] Another coin identification system could be based on measuring their thickness by a capacitance or electromagnetic sensor, placed for example near the outlet opening.

[0015] At the outlet, after the extraction trip, the dispenser shall be provided with a trapdoor for deflecting the coins. This trapdoor will be activated when the coin which passes must not be returned. In this case the coin is returned to the dispenser hopper. If the trapdoor is not activated the coin will be returned to the exterior.

[0016] The dispenser may include in the coin outlet area an optical sensor for detecting and counting the coins returned which will correspond to those delivered by the dispenser.

[0017] Whatever the measurement devices used to identify the coins, they will be placed near the outlet opening between a position of origin and said opening. The position of origin of the disc can be determined by an optical sensor in combination with a slotted disc related to shaft of the coin carrying disc. There will be as many positions of origin as coin carrying positions for the disc.

[0018] Measurement of the angle crossed by the disc for a precise measurement of coin diameter can be achieved by a pulse generator mounted on one of the reduction stages between the motor and the disc shaft. It will preferably be mounted on the motor shaft so that the best possible resolution is obtained.

[0019] As mentioned before discrimination or identification of coins can rely on measuring their diameter, thickness, alloy, weight or any other representative value differentiating the coins.

[0020] Further characteristics and advantages of the present invention will become apparent in view of the description made with reference to the accompanying drawings, which show an example of a non-limiting embodiment.

[0021] In the drawings:

Figure 1 is a front elevation of the rotary extractor

disc of a coin dispenser hopper, constructed according to the invention.

Figure 2 is a partial cross section of the hopper outlet taken along the II-II line of figure 1, with a coin in the outlet position.

Figure 3 is a section similar to that of figure 2 with a coin in the position of returning to the hopper.

Figure 4 is a view similar to figure 1 showing a coin in a position immediately in front of the outlet opening.

Figure 5 shows the driving motor for the rotary disc of figures 1 and 4.

[0022] Figure 1 shows rotary extractor disc with a traditional construction, which can for example define the inclined floor of the coin receiving hopper of a dispenser. This disc includes a crown 1 and a central cone 2, on the surface of which the coins slide to be directed towards the crown. Crown 1 is crossed by radial retractable pallets 3, each of which can carry a coin 4-4a in the direction of turn of the disc.

[0023] The dispenser hopper is provided with an outlet opening 5 in its wall which is located between an arm 6 and an extraction trip 7. Arm 6 is attached to the surface of crown 1 and shows a face 8 against which coins 4-4a collide so that they are directed towards outlet 5, through which they leave pushed by blades 3 causing trip 7 to swivel after each exit. Blades 4 are retracted from the surface of crown 1 as they pass beneath arm 6.

[0024] The construction described corresponds to that of a traditional dispenser.

[0025] According to a first characteristic of the invention, the dispenser is provided with means of detecting the value of coins 4-4a carried by crown or disc 1 before they reach outlet opening 5. These means may rely on measuring the diameter of the coins, which can be achieved by for example measuring the angle crossed by disc 1 between two positions, an initial fixed position, labelled as 9, which detects the passing of elements or predefined positions of the extractor disc 1, such as pallets 3, and another final position which can for example correspond to the moment when the coin reaches the outlet opening 5 and swivelling of trip 7 begins.

[0026] Initial position 9 can be determined for example by a fixed optical sensor which detects passing of pallets 3 or of slots in the same positions.

[0027] Disc 1 can be driven by a motor 16 which as shown in figure 5 may include in one of the reduction stages, preferably in the motor shaft, an impulse generator 17 combined with a reader 18, with which the angle travelled by rotary disc 1 can be measured, this system also permitting the precise measurement of the diame-

ter of the coins carried by trapdoors 3. This impulse counting will be performed during turning of disc 1 between an initial position 9 and a final position which may correspond to when trip 7 begins to swivel, due to the analysed coin beginning to exit, and which may be detected by a sensor 20, figure 1.

[0028] The value of the diameter of coins 4-4a can also be found by measuring the maximum angular displacement of swivelling trip 7, such as by a sensor 15, caused by the coin passing, as shown in figure 4.

[0029] Means of detection of the coin value can also be based on the alloy used in the coin, by electromagnetic sensors placed between the initial reference position 9 and extraction trip 7, and also by the coin thickness by a capacitance or electromagnetic sensor placed in this same area.

[0030] According to another characteristic of the invention, outlet 5 of the dispenser is provided with a deflection mechanism 10 which will determine the path to be taken by the coin, either towards the outlet to be collected by the user as indicated by arrow 11 in figures 1 and 4, or returning to the inside of the hopper as shown by arrow 12 in figure 4.

[0031] Mechanism 10 may consist of a trapdoor or pusher, figures 2 and 3, which may adopt a retracted inactive position labelled as 10' in figure 2 or an active or pushing position, figure 3. In the former position, shown in figure 2, coin 13 will be directed towards the opening to be collected, while in the position shown in figure 3 coin 13 is pushed towards the inside of the hopper to be recovered.

[0032] The dispenser will also include a sensor 14 which will check the exit of coin 13 towards collection chute 11.

[0033] The swivel angle of the extractor trip 7 can be measured by an angular or displacement sensor 15.

[0034] With the described construction, the dispenser hopper can include "m" different types of coins which arrive randomly at the measurement area beginning with detector 9 at the initial position. Since the detection means are placed immediately in front of outlet opening 5 when the coin reaches the position labelled as 18 in figure 4, mechanism 10 will have already received instructions on whether to allow the coin to continue to outlet 11 or to deflect it towards return or recovery 12, depending on whether the value of this coin agrees with the amount to be returned at the time.

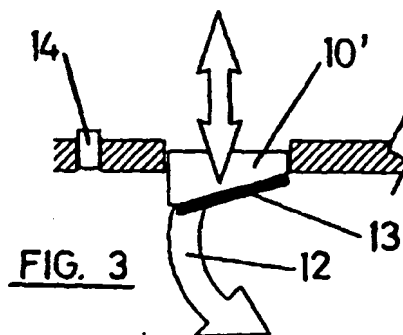
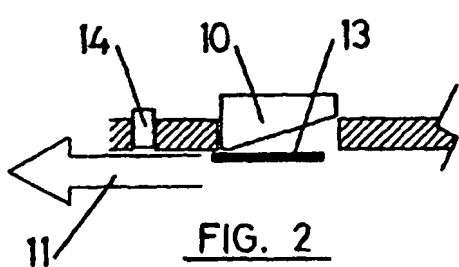
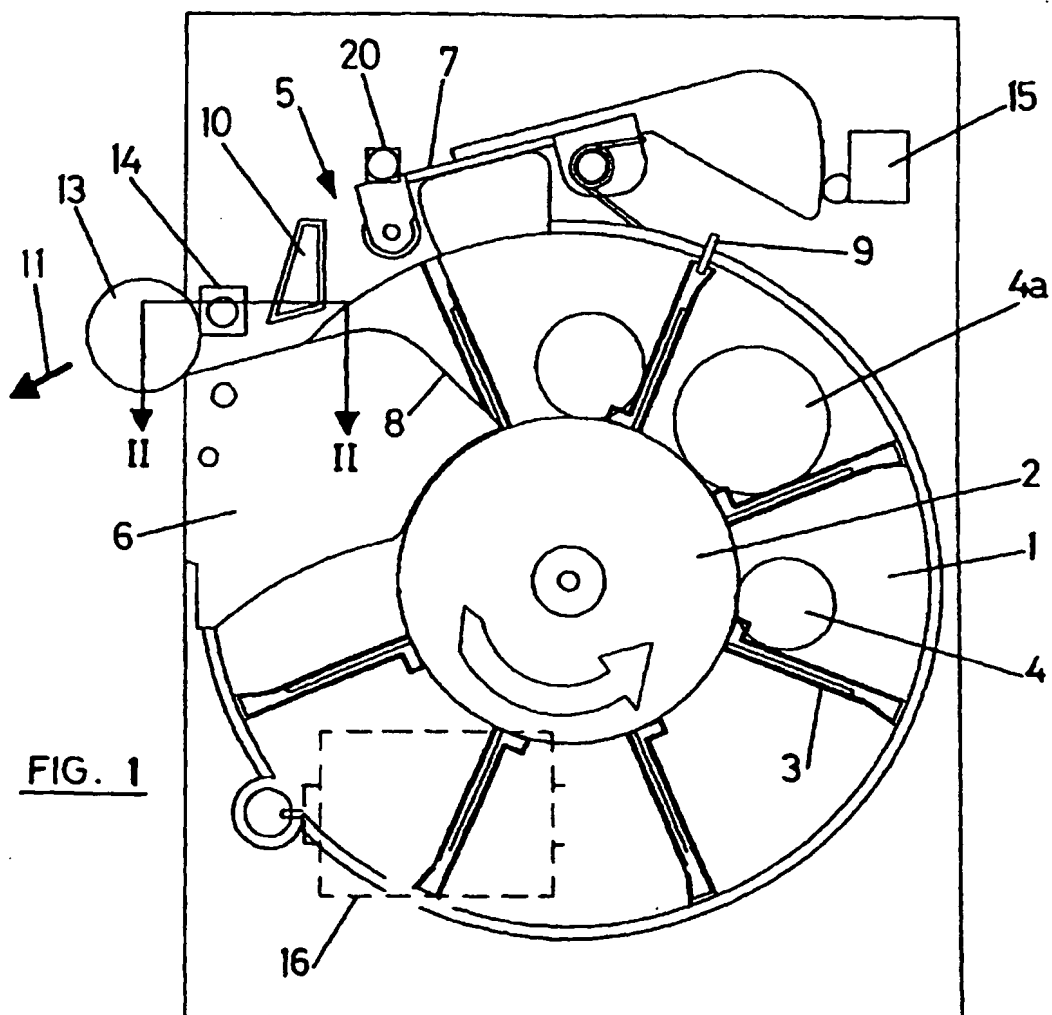
[0035] In short, the dispenser of the invention will be capable of discriminating the types of coins in its interior, before it is expelled out, and depending on the value detected it will either allow the coin to exit to be collected, or return it inside to the hopper.

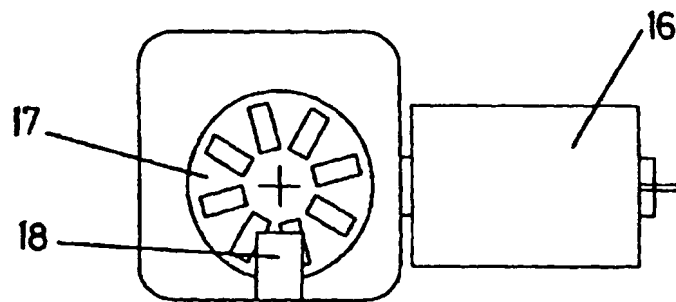
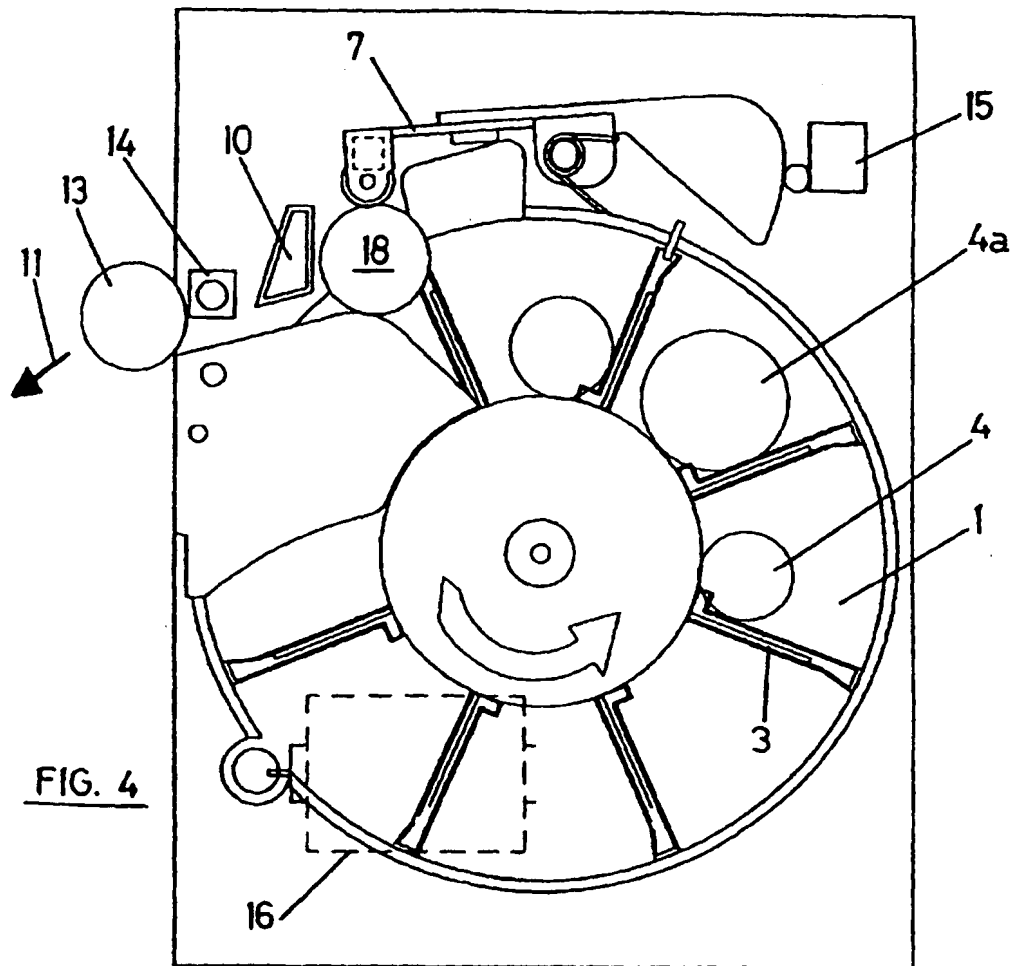
## Claims

1. Coin dispenser, comprising a coin collecting hopper, provided with a rotary extraction disc (1, 2)

which is provided in the surface facing the coins with means (3) of carrying the coins (4) individually, along the turning path of disc (1, 2), such path being intercepted by an arm (6) which deflects the coins towards an outlet opening (5) where an extraction trip (7) is placed, as well as counting and detection means (14, 15) of passing of coins, characterised in that it includes means for detecting the denomination or value of the coins carried by extractor disc (1, 2) before it leaves the hopper, and a deflection mechanism (10) which determines whether the coin (4) exits or returns, depending on whether its value agrees with the amount to be returned at each moment; these detection means being preferably located next to the outlet opening.

2. Dispenser as in claim 1, characterised in that the means for detection of the denomination or value of the coins identify the value of the coin at a location immediately in front of the outlet opening.
3. Dispenser as in claim 1, characterised in that the means for detecting the denomination or value of the coins rely on at least one distinguishing characteristic of the coins which the machine may admit.
4. Dispenser as in claim 3, characterised in that the distinguishing characteristic of the coins used is their diameter, the means of detecting the denomination of the coins consisting of an impulse counter which provides the angle turned by the coin carrying disc between an initial fixed position and a final position indicative of the start of displacement of the extraction trip caused by the coin being analysed.
5. Dispenser as in claim 3, characterised in that the distinguishing characteristic of the coins used is their diameter, the means of detecting the denomination of the coins consisting of an angular or displacement sensor which determines the angle turned by the extraction trip due to the passage of the coin being analysed.
6. Dispenser as in claim 1, characterised in that the deflection mechanism consists of a trapdoor placed after the hopper outlet, which can move between an inactive position which allows the coin to pass towards the outlet, and an active position which deflects said coin towards a recovery path.





## INTERNATIONAL SEARCH REPORT

Int. Appl. No.  
PCT/ES 99/00227

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G07D3/14 G07D9/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 G07D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 680 566 A (TANAKA ET AL.) 1 August 1972 (1972-08-01)	1-3, 5, 6
A	column 4, line 38 -column 12, line 46; figures 1-18	4
X	EP 0 044 640 A (ASAHI SEIKO KABUSHIKI KAISHA) 27 January 1982 (1982-01-27)	1-3, 5, 6
A	page 4, line 11 -page 9, line 15; figures 1-5	4
A	DE 44 32 803 C (STANDARDWERK EUGEN REIS GMBH) 29 February 1996 (1996-02-29)	1-6
	column 4, line 53 -column 7, line 49; figures 1-4.2	
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents:

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Date of the actual completion of the international search

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## INTERNATIONAL SEARCH REPORT

International Application No.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Form PCT/ISA/210 (continuation of second sheet) (July 1992)



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Information on patent family members

International Application No

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